# VOLUME 159 CONTENTS

## NUMBER 1, JANUARY 1998


**1–13** Probes and Microscopical Methods for the Localization of Pectins in Plant Cells
*Alain Jauneau, Stéphane Roy, Danièle Reis, and Brigitte Vian*

**14–22** Ultrastructural and Anatomical Factors Associated with Resistance to Cuticle Cracking in Tomato (*Lycopersicon esculentum* Mill.)
*Cheryld L. Whaley Emmons and John W. Scott*

**23–30** Underground Plant Movement. V. Contractile Root Tubers and Their Importance to the Mobility of *Hemerocallis fulva* L. (Hemerocallidaceae)
*Norbert Pütz*

**31–38** *Plectranthus madagascariensis:* Morphology of the Glandular Trichomes, Essential Oil Composition, and Its Biological Activity
*Lia Ascensão, A. Cristina Figueiredo, José G. Barroso, Luis G. Pedro, Jan Schripsema, Stanley G. Deans, and Johannes J. C. Scheffer*

**39–45** Nuclear-Encoded Chloroplast Proteins Accumulate in the Cytosol during Severe Heat Stress
*Scott A. Heckathorn, Craig A. Downs, and James S. Coleman*

**46–56** Procambial Initiation for the Vascular System in the Spikelet of Wheat
*Thompson Demetrio Pizzolato*

**57–64** Lateral Development and Florogenesis of a Tropical Shallot: A Comparison with Bulb Onion
*Yoram Krontal, Rina Kamenetsky, and Haim D. Rabinowitch*

**65–74** Patterns of Petal and Stamen Reduction in Australian Species of *Lepidium* L. (Brassicaceae)
*John L. Bowman and David R. Smyth*

**75–88** Schizogenous Secretory Cavities of *Citrus limon* (L.) Burm. f. and a Reevaluation of the Lysigenous Gland Concept
*Glenn W. Turner, Alison M. Berry, and Ernest M. Gifford*

**89–97** Seed Set in an Apomictic $BC_1$ Pearl Millet
*R. N. Morgan, P. Ozias-Akins, and W. W. Hanna*

**98–104** Effect of Environment on the Magnitude of Inbreeding Depression in Seed Germination in a Partially Self-Fertile Perennial Herb (*Blandfordia grandiflora,* Liliaceae)
*Mike Ramsey and Glenda Vaughton*

**105–109** Auxin-Modulated Protein Disulfide-Thiol Interchange Activity from Plasma Membranes of Spinach Leaves Responds to Photoperiod and NADH
*D. James Morré, Dorothy M. Morré, Claude Penel, and Hubert Greppin*

**110–115** Light Detection System in Mature Sunflower (*Helianthus annuus* L.) Chloroplasts: Wavelength Dependent or Total Photon Flux Density Related?
*Soumitra Ghoshroy and Wayne R. Fagerberg*

**116–120** Variation in Photosynthetic Characteristics along the Leaf Blade of *Oncidium* Goldiana, a $C_3$ Tropical Epiphytic Orchid Hybrid
*C. S. Hew, W. P. Soh, and C. K. Y. Ng*

**121–126** Nitrogen Metabolism in Tobacco Plants (*Nicotiana tabacum* L.): Role of Boron as a Possible Regulatory Factor
*J. M. Ruiz, M. Baghour, G. Bretones, A. Belakbir, and L. Romero*

**127–138** Intraspecific Variation in Salt Tolerance and Morphology in *Panicum hemitomon* and *Spartina alterniflora* (Poaceae)
*Mark W. Hester, Irving A. Mendelssohn, and Karen L. McKee*

**139–147** Narrow Hybrid Zone between Two Subspecies of Big Sagebrush (*Artemisia tridentata:* Asteraceae). V. Soil Properties
*Han Wang, David W. Byrd, Jeffrey L. Howard, E. Durant McArthur, John H. Graham, and D. Carl Freeman*

**148–152** Genetic Diversity in Island and Mainland Populations of *Aster spathulifolius* (Asteraceae)
*Masayuki Maki and Hiroko Morita*

**153–159** Cytology of *Paspalum malacophyllum* and Its Relationship to *P. juergensii* and *P. dilatatum*
*Byron L. Burson and Mark A. Hussey*

**160–171** Some Morphological Features of Wollemi Pine (*Wollemia nobilis:* Araucariaceae) and Their Comparison to Cretaceous Plant Fossils
*T. Carrick Chambers, Andrew N. Drinnan, and Stephen McLoughlin*

**172–174** The Origin and Early Diversification of Land Plants: A Cladistic Study, *Paul Kenrick and Peter Crane*
*Reviewed by Andrew H. Knoll*

## NUMBER 2, MARCH 1998

**iii** Dedication

**175–184** Sex, Smut, and RNA: The Complexity of Fungal Fimbriae
*M. Celerin and A. W. Day*

**185–191** Nonmeiotic Mechanisms of Recombination in the Anther Smut *Microbotryum violaceum*
*Alan W. Day*

**192–198** Theoretical Population Genetics of Mating-Type Linked Haplo-Lethal Alleles
*Janis Antonovics, Kara O'Keefe, and Michael E. Hood*

**199–205** Two-Celled Promycelia and Mating-Type Segregation in *Ustilago violacea* (*Microbotryum violaceum*)
*M. E. Hood and J. Antonovics*

**206–212** Isolation of a Novel Gene (*HSGc11*) Whose Expression Is Apparently Limited to the Hyphal Stage of *Microbotryum violaceum*
*Long Wang and Michael H. Perlin*

**213–220** Extracellular Accumulation of Rhodotorulic Acid in Strains of *Microbotryum violaceum*
*Laura E. Birch and Manfred Ruddat*

**221–227** The Effect of *Microbotryum violaceum* Spores on Pollen Germination in *Silene acaulis*
*Deborah L. Marr*

**228–235** Anther Smut Transmission in *Silene latifolia* and *Silene dioica:* Impact of Host Traits, Disease Frequency, and Host Density
*Arjen Biere and Sonja C. Honders*

**236–243** Phenotypic Changes in Host Plants Diseased by *Microbotryum violaceum:* Parasite Manipulation, Side Effects, and Trade-Offs
*Jacqui A. Shykoff and Oliver Kaltz*

**244–248** A Preliminary Study of the Carotenoids of Some North American Species of *Cantharellus*
*D. Mui, T. Feibelman, and J. W. Bennett*

**249–260** Fasciation Mutation Enhances Meristematic Activity and Alters Pattern Formation in Soybean
*Yuhong Tang and Halina T. Knap*

**261–274** Inflorescence and Flower Development in the Hedychieae (Zingiberaceae): *Scaphochlamys kunstleri* (Baker) Holttum
*Bruce K. Kirchoff*

**275–282** Studies on Vein Formation in the Leaf of the Fern *Thelypteris palustris* Schott.
*Robert W. Korn*

**283–296** The Influence of Shoot Growth on the Pattern of Axillary Development on the Long Shoots of Young Apple Trees (*Malus domestica* Borkh.)
*Pierre-Eric Lauri and Eric Térouanne*

**297–304** Anatomy and Ultrastructure of *Wolffia columbiana* and *Wolffia borealis,* Two Nonvascular Aquatic Angiosperms
*Sandra L. White and Robert R. Wise*

**305–312** Nitrate Uptake Rate by Soybean and Wheat Plants Determined by External Nitrate Concentration and Shoot-Mediated Demand
*Carole H. Saravitz, Florence Devienne-Barret, C. David Raper, Jr., Sylvain Chaillou, and Thierry Lamaze*

313–317 Action of Compatible Osmotica and Growth Regulators in Alleviating the Effect of Salinity on the Germination of Dimorphic Seeds of *Arthrocnemum indicum* L.
*M. Ajmal Khan, Irwin A. Ungar, and Bilquees Gul*

318–330 Growth of Young Trees of *Acer platanoides* and *Quercus robur* along a Gap-Understory Continuum: Interrelationships between Allometry, Biomass Partitioning, Nitrogen, and Shade Tolerance
*Ülo Niinemets*

331–337 Pollinator Selection, Quantitative Genetics, and Predicted Evolutionary Responses of Floral Traits in *Penstemon centranthifolius* (Scrophulariaceae)
*Randall J. Mitchell, Ruth G. Shaw, and Nickolas M. Waser*

338–350 Effects of Maternal Nutrient Environment and Maturation Position on Seed Heteromorphism, Germination, and Seedling Growth in *Triplasis purpurea* (Poaceae)
*Gregory P. Cheplick and Lina Y. Sung*

351–357 Population Genetic Structure and Conservation of an Endangered Conifer, *Cathaya argyrophylla* (Pinaceae)
*Song Ge, De-yuan Hong, Hai-qun Wang, Zheng-yu Liu, and Can-ming Zhang*

358–366 A New Fossil Conifer from the Triassic of North America: Implications for Models of Ovulate Cone Scale Evolution
*Brian J. Axsmith, Thomas N. Taylor, and Edith L. Taylor*

367–390 *Taxodium wallisii* sp. nov.: First Occurrence of *Taxodium* from the Upper Cretaceous
*Kevin R. Aulenbeck and Ben A. LePage*

391–404 New Genus of Fossil Fagaceae from the Santonian (Late Cretaceous) of Central Georgia, U.S.A.
*Hallie J. Sims, Patrick S. Herendeen, and Peter R. Crane*

## NUMBER 3, MAY 1998

405–417 Flower Development and Male Sterility in *Ocotea tenera* (Lauraceae): A Gynodioecious Tropical Tree
*J. Phil Gibson and Pamela K. Diggle*

418–439 Floral Development of *Agalinis neoscotica, Agalinis paupercula* var. *borealis,* and *Agalinis purpurea* (Scrophulariaceae): Implications for Taxonomy and Mating System
*Heather M. Stewart and Judith M. Canne-Hilliker*

440–445 Mating System of *Ophiopogon xylorrhizus* (Liliaceae), an Endangered Species in Southwest China
*Tian-hua He, Guang-yuan Rao, Rui-lin You, and Song Ge*

446–465 Structure and Development of the Flowers in *Mendoncia, Pseudocalyx,* and *Thunbergia* (Acanthaceae) and Their Systematic Implications
*Jürg Schönenberger and Peter K. Endress*

466–479 Reversal in Ovary Position from Inferior to Superior in the Haemodoraceae: Evidence from Floral Ontogeny
*Michael G. Simpson*

480–491 Quantitative Leaf Anatomy of $C_3$ and $C_4$ Cyperaceae and Comparisons with the Poaceae
*Connie L. Soros and Nancy G. Dengler*

492–503 Histochemical and Immunocytochemical Localization of Tropane Alkaloids in *Erythroxylum coca* var. *coca* and *E. novogranatense* var. *novogranatense*
*Jorge F. S. Ferreira, Stephen O. Duke, and Kevin C. Vaughn*

504–512 Apparent Differences in the Posttranslational Modification of Peroxidase between Flax Genotrophs and Genotypes and between Normal and Stress-Induced Isozymes
*M. A. Fieldes and K. E. Gerhardt*

513–521 Comparative Methods of Estimating Freezing Temperatures and Freezing Injury in Leaves of Chaparral Shrubs
*G. C. Boorse, T. L. Bosma, A.-C. Meyer, F. W. Ewers, and S. D. Davis*

522–532 A New Genus of Coryloideae (Betulaceae) from the Paleocene of North America
*Steven R. Manchester and Zhi-Duan Chen*

## NUMBER 4, JULY 1998


**533–538** Overlapping Yet Distinct Promoter Activities of Two *Arabidopsis* Genes Coding for Nearly Identical Isoforms of the Acyl Carrier Protein
*Scott R. Baerson, Matthew G. Vander Heiden, and Gayle K. Lamppa*

**539–549** Floral Development of Dioecious Staghorn Sumac, *Rhus hirta* (Anacardiaceae)
*Jason B. Gallant, James R. Kemp, and Christian R. Lacroix*

**550–558** Formation of Panicles and Hermaphroditic Florets in Wild-Rice
*Qinqin Liu, Ervin A. Oelke, Raymond A. Porter, and Ryan Reuter*

**559–565** Is Fluctuating Asymmetry a Reliable Biomonitor of Stress? A Test Using Life History Parameters in Soybean
*Premchand Anne, Faisal Mawri, Sarah Gladstone, and D. Carl Freeman*

**566–574** Pollen Tube Pathway in Chalazogamous *Pistacia vera* L.
*E. Martínez-Pallé and M. Herrero*

**575–580** Ultrastructure of Extracellular Matrix Deposits Associated with Conidia of the Powdery Mildew Fungus *Blumeria graminis* f. sp. *hordei*
*Donald R. Roberts, Jr., and Charles W. Mims*

**581–589** Ultrastructural Studies of Spores and Hypha of a *Glomus* Species
*Leonor Costa Maia and James W. Kimbrough*

**590–598** Cytoskeletal Stability Affects Cotton Fiber Initiation
*Robert W. Seagull*

**599–605** Freezing Tolerance of Selected *Pennisetum* Species
*D. W. Stair, M. L. Dahmer, E. C. Bashaw, and M. A. Hussey*

**606–615** Clonal Diversity in Alpine Populations of *Polygonum viviparum* (Polygonaceae)
*Pamela K. Diggle, Steven Lower, and Tom A. Ranker*

**616–626** Effects of Temperature during Microsporogenesis on Pollen Performance in *Cucurbita pepo* L. (Cucurbitaceae)
*Magnús H. Jóhannsson and Andrew G. Stephenson*

**627–636** Isozymes in *Sorbus aucuparia* (Rosaceae: Maloideae): Genetic Analysis and Evolutionary Significance of Zymograms
*Olivier Raspé, Anne-Laure Jacquemart, and Jacques De Sloover*

**637–647** The Influence of Achene Type and Plant Density on Growth and Biomass Allocation in the Heterocarpic Annual *Catananche lutea* (Asteraceae)
*E. Ruiz de Clavijo and M. J. Jiménez*

**648–654** Regeneration Potential of the Canopy-Held Seeds of *Melaleuca quinquenervia* in South Florida
*Min B. Rayachhetry, Thai K. Van, and Ted D. Center*

**655–667** Stamen Morphology in *Nothofagus* (Nothofagaceae)
*Andrew C. Rozefelds*

**668–686** Lauraceous Inflorescences and Flowers from the Cenomanian of Bohemia (Czech Republic, Central Europe)
*Helena Eklund and Jiří Kvaček*


## NUMBER 5, SEPTEMBER 1998


**687–694** Studies into Abstract Properties of Individuals. II. Analysis for Emergence in Populations, Species, and a Species-Pair
*Jack Maze*

**695–701** Restoration of Juvenility in Maize Shoots by Meristem Culture
*Erin E. Irish and Sarah Karlen*

**702–715** Organ and Cell Fusions in the *adherent1* Mutant in Maize
*Neelima Sinha*

**716–723** Ontogeny of the Vascular Bundles and Contiguous Tissues in the Barley Leaf Blade
*Christina L. Trivett and Ray F. Evert*

**724–737** Ultrastructural Study of Lipid Accumulation in Tapetal Cells of *Brassica napus* L. cv. Westar during Microsporogenesis
*Kathryn A. Platt, Anthony H. C. Huang, and William W. Thomson*

**738–743** Development of the Rough Endoplasmic Reticulum in Incompatible Pollen Tubes of *Brugmansia suaveolens* (Solanaceae)
*Björn Walles and Shu Ping Han*

**744–749** The Spiny Pollen Wall in *Sauromatum* (Araceae)—with Special Reference to the Endexine
*Martina Weber, Heidemarie Halbritter, and Michael Hesse*

**750–752** Immunological Detection of an Inositol 1,4,5-Trisphosphate Receptor in Microsomes from *Vicia faba* (L.) and *Zea mays* (L.) and Broadbean Vacuoles
*Hubert Cramer, Michael Meinhard, Margot Schulz, and Heide Schnabl*

**753–761** A Histological and Structural Study of *Phacelia tanacetifolia* Endosperm in Developing, Mature, and Germinating Seed
*G. Serrato-Valenti, M. G. Mariotti, L. Cornara, and A. Corallo*

**762–772** Histological and Chemical Characterization of *Myrsine laetevirens* Seed
*Marisa Otegui, Carlos Lima, Sara Maldonado, and Rosa M. De Lederkremer*

**773–779** Correlations between Epicuticular Wax Structures and Chemical Composition in *Arabidopsis thaliana*
*Aaron M. Rashotte and Kenneth A. Feldmann*

**780–787** Structural Similarities between Surface Layers of Selected Charophycean Algae and Bryophytes and the Cuticles of Vascular Plants
*Martha E. Cook and Linda E. Graham*

**788–797** SEM Studies on Vessels in Ferns. X. Selected Osmundaceae and Schizaeaceae
*Sherwin Carlquist and Edward L. Schneider*

**798–804** Evidence That Premature Senescence Affects Photosynthetic Decline of Wheat Flag Leaves during Growth in Elevated Carbon Dioxide
*Richard C. Sicher and James A. Bunce*

**805–811** Responses to Short-Term Reductions in Light in Soybean Leaves: Effects of Leaf Position and Drought Stress
*Philip A. Fay and Alan K. Knapp*

**812–820** Functional Leaf Phenotypes for Shaded and Open Environments of a Dominant Dwarf Bamboo (*Sasa senanensis*) in Northern Japan
*Thomas T. Lei and T. Koike*

**821–825** Parent-Progeny Relationships for Carbon Isotope Discrimination and Related Characters in Crested Wheatgrass
*K. H. Asay, D. A. Johnson, and A. J. Palazzo*

**826–832** High Salt Tolerance in Germinating Dimorphic Seeds of *Arthrocnemum indicum*
*M. Ajmal Khan and Bilquees Gul*

**833–842** Reproductive Phenology and Reproductive Success of Teak (*Tectona grandis* L. F.)
*Endah R. Palupi and John N. Owens*

**843–847** Low Reproductive Success in Two Subspecies of *Juniperus oxycedrus* L.
*Pedro L. Ortiz, Montserrat Arista, and Salvador Talavera*

**848–852** Spore Germination in Populations of *Schizaea pusilla* from New Jersey and Nova Scotia
*Helen Guiragossian Kiss and John Z. Kiss*

**853–863** Analysis of a Transition Matrix Model for *Gaura neomexicana* ssp. *coloradensis* (Onagraceae) Reveals Spatial and Temporal Demographic Variability
*Sandra K. Floyd and Tom A. Ranker*

**864–869** Identification of Genotypes of Lemon by Flow Cytometry and RAPD Markers
*D. Iannelli, C. Cottone, M. Viscardi, L. D'Apice, R. Capparelli, and M. Boselli*

**870–879** *Gleichenia chaloneri*—a New Fossil Fern from the Lower Cretaceous (Albian) of England
*Patrick S. Herendeen and Judith E. Skog*

## NUMBER 6, NOVEMBER 1998


| | |
|---|---|
| iii | Reviewer List |
| 881–890 | Tracheid Structure in a Primitive Extant Plant Provides an Evolutionary Link to Earliest Fossil Tracheids<br>*Martha E. Cook and William E. Friedman* |
| 891–905 | Phylogenetics of the Hamamelidae and Their Allies: Parsimony Analyses of Nucleotide Sequences of the Plastid Gene *rbc*L<br>*Yin-Long Qiu, Mark W. Chase, Sara B. Hoot, Elena Conti, Peter R. Crane, Kenneth J. Sytsma, and Clifford R. Parks* |
| 906–922 | Ontogeny and Diversity in Staminate Flowers of *Nothofagus* (Nothofagaceae)<br>*Andrew C. Rozefelds and Andrew N. Drinnan* |
| 923–940 | Cuticle Micromorphology of *Podocarpus*, Subgenus *Podocarpus*, Section *Scytopodium* (Podocarpaceae) of Madagascar and South Africa<br>*Ruth A. Stockey, Brenda J. Frevel, and Philippe Woltz* |
| 941–947 | Pollen Fertility and Flowering Phenology in an Androdioecious Tree, *Fraxinus lanuginosa* (Oleaceae), in Hokkaido, Japan<br>*Kiyoshi Ishida and Tsutom Hiura* |
| 948–957 | Gynodioecy and Reproductive Trait Variation in Three *Thymus* Species (Lamiaceae)<br>*Domenica Manicacci, Anne Atlan, Juana Anna Elena Rossello, and Denis Couvet* |
| 958–967 | Seasonal Dynamics in Reproduction of First-Year Females and Males in *Silene dioica*<br>*Åsa M. Hemborg* |
| 968–978 | Recent Perspectives on Synthetic Seed Technology Using Nonembryogenic *In Vitro*–Derived Explants<br>*A. Standardi and E. Piccioni* |
| 979–988 | Lignotuber Bud Development in *Eucalyptus cinerea* (F. Muell. ex Benth)<br>*A. W. Graham, M. A. Wallwork, and M. Sedgley* |
| 989–995 | Destruction of Fungal Melanins by Ligninases of *Phanerochaete chrysosporium* and Other White Rot Fungi<br>*M. J. Butler and A. W. Day* |
| 996–1001 | Foliar Reflectance and Vector Analysis Reveal Nutrient Stress in Prey-Deprived Pitcher Plants (*Nepenthes rafflesiana*)<br>*Jonathan A. Moran and Alison J. Moran* |
| 1002–1009 | Anatomical and Morphological Alterations in Longleaf Pine Needles Resulting from Growth in Elevated $CO_2$: Interactions with Soil Resource Availability<br>*Seth G. Pritchard, Cecilia Mosjidis, Curt M. Peterson, G. Brett Runion, and Hugo H. Rogers* |
| 1010–1017 | Effects of Woody Plants on Microclimate in a Semiarid Woodland: Soil Temperature and Evaporation in Canopy and Intercanopy Patches<br>*David D. Breshears, John W. Nyhan, Christopher E. Heil, and Bradford P. Wilcox* |
| 1018–1022 | Genetics of *Ustilago violacea*. XXXIV. Genetic Evidence for a Transposable Element Functioning during Mitosis and Two Transposable Elements Functioning during Meiosis<br>*E. D. Garber and M. Ruddat* |
| 1023–1033 | *Aculeovinea yunguiensis* Gen. et Sp. Nov. (Gigantopteridales), a New Taxon of Gigantopterid Stem from the Upper Permian of Guizhou Province, China<br>*Hongqi Li and David Winship Taylor* |
| 1037–1042 | Volume 159 Contents |
| 1043–1044 | Volume 159 Author Index |
| 1045–1047 | Volume 159 Subject Index |